

55. The method of Claim 51 wherein the substrate has a plurality of types of oligonucleotides attached to it in an array to allow for the detection of multiple portions of a single nucleic acid, the detection of multiple different nucleic acids, or both.

56. A method of detecting nucleic acid having at least two portions comprising:  
 providing a substrate having oligonucleotides attached thereto;  
 providing an aggregate probe comprising at least two types of nanoparticles having oligonucleotides attached thereto, the nanoparticles of the aggregate probe being bound to each other as a result of the hybridization of some of the oligonucleotides attached to them, at least one of the types of nanoparticles of the aggregate probe having oligonucleotides attached thereto which have a sequence complementary to a first portion of the sequence of a nucleic acid to be detected;  
 providing a type of nanoparticles having at least two types of oligonucleotides attached thereto, the first type of oligonucleotides having a sequence complementary to a second portion of the sequence of said nucleic acid, the second type of oligonucleotides having a sequence complementary to at least a portion of the sequence of the oligonucleotides attached to the substrate;  
 contacting said nucleic acid, the aggregate probe, the nanoparticles and the substrate, the contacting taking place under conditions effective to allow hybridization of said nucleic acid with the oligonucleotides on the aggregate probe and on the nanoparticles and hybridization of the oligonucleotides on the nanoparticles with the oligonucleotides on the substrate; and  
 observing a detectable change.

57. The method of Claim 56 wherein said nucleic acid is contacted with the aggregate probe and the nanoparticles so that said nucleic acid hybridizes with the oligonucleotides on the aggregate probe and with the oligonucleotides on the nanoparticles, and said nucleic acid bound to the aggregate probe and nanoparticles is then contacted with

the substrate so that the oligonucleotides on the nanoparticles hybridize with the oligonucleotides on the substrate.

58. The method of Claim 56 wherein said nucleic acid is contacted with the aggregate probe so that said nucleic acid hybridizes with the oligonucleotides on the aggregate probe, said nucleic acid bound to the aggregate probe is then contacted with the nanoparticles so that said nucleic acid hybridizes with the oligonucleotides on the nanoparticles, and said nucleic acid bound to the aggregate probe and nanoparticles is then contacted with the substrate so that the oligonucleotides on the nanoparticles hybridize with the oligonucleotides on the substrate.

59. The method of Claim 56 wherein said nucleic acid is contacted with the aggregate probe so that said nucleic acid hybridizes with the oligonucleotides on the aggregate probe, the nanoparticles are contacted with the substrate so that the oligonucleotides on the nanoparticles hybridize with the oligonucleotides on the substrate, and said nucleic acid bound to the aggregate probe is then contacted with the nanoparticles bound to the substrate so that said nucleic acid hybridizes with the oligonucleotides on the nanoparticles.

60. The method of Claim 56 wherein the substrate has the oligonucleotides attached to it in an array to allow for the detection of multiple portions of a single nucleic acid, the detection of multiple different nucleic acids, or both.

61. The method of any one of Claims 49-60 wherein the substrate is a transparent substrate or an opaque white substrate.

62. The method of Claim 61 wherein the detectable change is the formation of dark areas on the substrate.

63. The method of any one of Claims 49-60 wherein the nanoparticles in the aggregate probe are made of gold.

64. The method of any one of Claims 49-60 wherein the substrate is contacted with a silver stain to produce the detectable change.

65. The method of any one of Claims 49-60 wherein the detectable change is observed with an optical scanner.

66. A method of detecting nucleic acid having at least two portions comprising:  
 contacting a nucleic acid to be detected with a substrate having oligonucleotides attached thereto, the oligonucleotides having a sequence complementary to a first portion of the sequence of said nucleic acid, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the substrate with said nucleic acid;

contacting said nucleic acid bound to the substrate with liposomes having oligonucleotides attached thereto, the oligonucleotides having a sequence complementary to a portion of the sequence of said nucleic acid, the contacting taking place under conditions effective to allow hybridization of the oligonucleotides on the liposomes with said nucleic acid;

providing an aggregate probe comprising at least two types of nanoparticles having oligonucleotides attached thereto, the nanoparticles of the aggregate probe being bound to each other as a result of the hybridization of some of the oligonucleotides attached to them, at least one of the types of nanoparticles of the aggregate probe having oligonucleotides attached thereto which have a hydrophobic group attached to the end not attached to the nanoparticles;